

## Door-in-Door Out Best Practice Strategies

The Western States Task Force advocates these 9 key best practice strategies for improving door-in-door-out times for acute ischemic stroke patients requiring transfer for a higher level of care. *These strategies were developed with a focus on mechanical endovascular reperfusion (MER) eligible cases, but could also be applied to other stroke transfers.*

- 1. Target Door-in-Door-out Times:** Establish a policy that specifies the expected door-in-door-out times—ideally a goal of  $\leq 90$  minutes in 50 percent or more of acute ischemic stroke patients transferred.
- 2. Rapid Administration of IV Thrombolysis:** Follow Target: Stroke Phase I, II, and III Key Best Practice Strategies. *Target: Stroke Key Best Practice Strategies available at: <https://www.heart.org/en/professional/quality-improvement/target-stroke/clinical-tools-and-resources>*
- 3. Rapid Initiation of Transfer Process:**
  - Consider developing pre-existing transfer agreements with automatic acceptance.
  - Formalize agreements with transporting EMS agencies; include their capabilities and expected response times.
  - Implement parallel workflows for the assessment and transfer process.
  - Initiate the transfer process early when appropriate based on exam; may not need to wait for large vessel occlusion (LVO) confirmation.
- 4. Participate in a Regional System of Care:**
  - Complete prehospital screening, use an LVO scale, and ensure prenotification by EMS.
  - Where EMS is both the 911 and transfer provider, consider having EMS stand-by for suspected LVO patients for immediate transfer once imaging is performed.
- 5. Use of Telemedicine:**
  - Integrate telemedicine into the transfer process, where utilized.
  - Initiate contact with the telemedicine provider early so they are involved in initial patient evaluation.
  - Ensure imaging is available to the telemedicine provider to help inform decision making.
- 6. Rapid Acquisition, Interpretation, and Transmission of Neuro Imaging:**
  - Perform CT/MR Angiography concurrently with non-contrast CT (NCCT).
  - Send NCCT and CT/MR Angiography for imaging interpretation immediately.
  - Do not delay IV thrombolysis for any advanced imaging beyond NCCT (or MR).
- 7. Expedited Transport Handoff:**
  - Create standardized templates for the handoff process.
  - When possible, complete EMS handoff while the transporting provider is en route to the transferring facility.
  - Expedite direct handoff from transferring facility (Spoke) to receiving facility (Hub) without delaying patient's departure.
- 8. Mock Code Strokes:** Encourage routine mock codes that include transfer scenarios; include external staff who are involved in the transfer process (e.g., EMS, receiving facility).
- 9. Prompt Data Collection, Feedback and Quality Improvement:** Measure and track performance at the hospital and system of care levels, and promptly provide feedback.

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### Additional References

- Al Kasab S, Almallouhi E, Harvey J, et al. Door in door out and transportation times in 2 telestroke networks. *Neurol Clin Pract*. 2019;9(1):41-47. Doi:0.1212/CPJ.0000000000000570.
- Black GB, Ramsay AIG, Baim-Lance A, et al. What does it take to provide clinical interventions with temporal consistency? A qualitative study of London hyper acute stroke units. *BMJ Open*. 2019;9(11):e025367. doi:10.1136/bmjopen-2018-025367.
- Craig LE, McInnes E, Taylor N, et al. Identifying the barriers and enablers for a triage, treatment, and transfer clinical intervention to manage acute stroke patients in the emergency department: a systematic review using the theoretical domains framework (TDF). *Implement Sci*. 2016;11(1):157.
- Craig LE, Taylor N, Grimley R, et al. Development of a theory-informed implementation intervention to improve the triage, treatment, and transfer of stroke patients in emergency departments using the Theoretical Domains Framework (TDF): the T3 Trial. *Implement Sci*. 2017;12(1):88. doi:10.1186/s13012-017-0616-6
- Eckstein M, Schlesinger SA, Sanko S. Interfacility Transports Utilizing the 9-1-1 Emergency Medical Services System. *Prehosp Emerg Care*. 2015;19(4):490-495. doi:10.3109/10903127.2015.1005258.
- Fonarow GC, Smith EE, Saver JL, Reeves MJ, Hernandez AF, Peterson ED, Sacco RL, Schwamm LH. Improving door-to-needle times in acute ischemic stroke: the design and rationale for the American Heart Association/American Stroke Association's Target: Stroke initiative. *Stroke*. 2011;42:2983-2989.
- Fonarow GC, Zhao X, Smith EE, Saver JL, Reeves MJ, Bhatt DL, Xian Y, Hernandez AF, Peterson ED, Schwamm LH. Door-to-needle times for tissue plasminogen activator administration and clinical outcomes in acute ischemic stroke before and after a quality improvement initiative. *JAMA*. 2014;311:1632-1640.
- George BP, Doyle SJ, Albert GP, et al. Interfacility Transfers for US Ischemic Stroke and TIA, 2006-2014. *Neurology*. 2018;90(18):e1561-e1569. doi:10.1212/WNL.
- Janssen PM, Venema E, Dippel DWJ. Effect of Workflow Improvements in Endovascular Stroke Treatment. *Stroke*. 2019;50(3):665-674. doi:10.1161/strokeaha.118.021633.
- Kodankandath TV, Wright P, Power PM, et al. Improving Transfer Times for Acute Ischemic Stroke Patients to a Comprehensive Stroke Center. *J Stroke Cerebrovasc Dis*. 2017; 26(1):192-195.
- Magdon-Ismael Z, Benesch C, Cushman JT, et al. Establishing Recommendations for Stroke Systems in the Thrombectomy Era: The Upstate New York Stakeholder Proceedings. *Stroke*. 2017;48(7): 2003-2006. doi:10.1161/strokeaha.117.017412.
- McTaggart RA, Moldovan K, Oliver LA, et al. Door-in-Door-Out Time at Primary Stroke Centers May Predict Outcome for Emergent Large Vessel Occlusion Patients. *Stroke*. 2018;49(12):2969-2974. doi:10.1161/STROKEAHA.118.021936.
- Menon, B. K., Xu, H., Cox, M., Saver, J. L., Goyal, M., Peterson, E. D., . . . Smith, E. E. (2018, September 21). Components and Trends in Door to Treatment Times for Endovascular Therapy in GWTG-Stroke Hospitals. *Circulation*. Retrieved from <https://www.ahajournals.org/doi/pdf/10.1161/CIRCULATIONAHA.118.036701>.
- Ng FC., Low E, Andrew E, et al. Deconstruction of Interhospital Transfer Workflow in Large Vessel Occlusion. *Stroke*. 2017;48(7):1976-1979. doi:10.1161/strokeaha.117.017235.
- Parikh NS, Chatterjee A, Díaz I, et al. Modeling the Impact of Interhospital Transfer Network Design on Stroke Outcomes in a Large City. *Stroke*. 2018;49(2):370-376. doi:10.1161/STROKEAHA.117.018166
- Sauser Zachrisson K, Schwamm LH. Implementation of Rapid Treatment and Interfacility Transport for Patients With Suspected Stroke by Large-Vessel Occlusion: In One Door and Out the Other. *JAMA Neurol*. 2017;74(7):765-766. doi:10.1001/jamaneurol.2017.0324
- Slivinski A, Jones R, Whitehead H, et al. Improving Access to Stroke Care in the Rural Setting: The Journey to Acute Stroke Ready Designation. *J Emerg Nurs*. 2017;43(1):24-32. doi:10.1016/j.jen.2016.10.006.
- Xian Y, Xu H, Lytle B, Blevins J, Peterson ED, Hernandez AF, Smith EE, Saver JL, Messe SR, Paulsen M, Suter RE, Reeves MJ, Jauch EC, Schwamm LH, Fonarow GC. Use of strategies to improve door-to-needle times with tissue-type plasminogen activator in acute ischemic stroke in clinical practice: findings from Target: Stroke. *Circ Cardiovasc Qual Outcomes*. 2017;10:e003227. doi:10.1161/CIRCOUTCOMES.116.003227.
- Yang SJ, Franco T, Wallace N, et al. Effectiveness of an interdisciplinary, Nurse Driven In-hospital Code Stroke Protocol on an In-patient Ischemic Stroke Recognition and Management. *J Stroke Cerebrovasc Dis*. 2019; 28(12):e104398. doi:10.1016/j.jstrokecerebrovasdis.2019.104398.